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CHANGING MEDICAL CARE IN OUR CHANGING NATIONAL LIFE*

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SINCE I am addressing the pediatric section of the Academy, my audience may expect me to dwell on the social problems related to the care of children. But the care of children is just a part of the medical care problem of the population in general and cannot be separated, although attempts were proposed in the Pepper Bill and in the minority report No. 1 of the New York Legislative Commission on Medical Care. Accordingly I shall treat the topic in its general aspects. But before beginning I must make an explanation. I shall speak as if the medical care problem pertained only to physicians, hospitals, medical schools and the people although I realize as much as anyone that it concerns also dentists, public health workers, nurses, social workers, laboratory workers and all others whose duties are concerned with the maintenance of health and the problems of disease. I include the *people* with all the emphasis I possess, because, the general policies under which public funds are expended must be developed fully in the interest of those who

* Read April 10, 1947 at the Centennial Meeting of the Section of Pediatrics of The New York Academy of Medicine.

are to be served, the consumers of the medical care. Although by universal admission the sole authority in all matters pertaining to the applied science and art of medicine is the physician, in the economic aspect of medical care and to a considerable extent in the administrative the consumers, i.e., the people themselves, have equal rights and are equally concerned with the physicians. How much medical care will cost, how paid for, in what form it will be offered and just how it will be carried out, these are matters vital to the people also. So, on every administrative board which decides or administers medical care plans at every level, federal, state, or local, the receivers of medical care, the people, must be adequately represented together with the professional groups, the givers. I say this because I think that many physicians, probably most, feel that they are the sole authorities, the only ones who really know what is best and that the people should meekly receive what they decide to give. They forget that physicians are a vested interest and are instruments, not ends and our own selfish hopes and wishes loom large, so as to blot out parts of the perspective or hide the view altogether and in consequence we unconsciously think first of how to safeguard our own comfort and profit rather than the best interests of the people whom we serve.

If I remember correctly, in the brief time when the present Duke of Windsor was King of England, he visited the slums of London to see with his own eyes the housing conditions and on that occasion made a profound remark which evoked great praise in the British press. The remark was: "Something must be done about it." I think we are all convinced that something must be done about the present state of medical care but what form that *something* should take and how that *something* should be put into effect have stirred up great conflicts of opinion.

Why is it so necessary to change the present system of medical care? The present system has developed spontaneously to fit the distribution of money, not the distribution of medical need, and as a result it does not meet the medical need and, no matter how it might be extended, could never meet the medical need in one thousand years, for the reason that it operates on an incorrect principle. Another reason is that its fee-for-service system of remuneration keeps it from taking on a preventive character because the person who pays a fee to his physician at each visit goes to him only when sick. Another reason is that the

science of medicine has developed with such strides that the requirements of medical care have changed and groups of minds must now collaborate, since single minds can no longer be masters of more than small parts of medical knowledge. Moreover, as in industry, laboratories and machines of great complexity have become essential. As the result of all this the family physician who was once so adequate can no longer by himself meet all necessary services. He and his patients must have available specialists, x-ray service, laboratories, etc. Finally, this transformation of medical care into something far more complex and beneficial has unfortunately so increased its cost that it has risen out of reach of the majority of people. Without presenting the evidence the present happy-go-lucky, haphazard system of medical care has become outmoded and out of joint and is hopelessly insufficient and inadequate to meet the health requirements of the nation. This is one side of the picture. The other is that the great advances in science and industry have made possible higher standards of living. Moreover, the methods of science have been employed as never before in economics and sociology with the result that the facts of living, including health, have been studied and are intimately known. The knowledge thus gained has brought to pass a greatly intensified social consciousness and feeling of social responsibility, in brief, to an intensification of democracy in the finest sense of the word, meaning thereby the general acceptance of the principle that individuals have equal rights to fair shares of the comforts and benefits of life. Finally, large groups of the population, in particular labor and farm groups, have awakened to the idea that a new kind of medicine has come into being; wanting it, we see them on all sides organizing in the attempt to secure it. As a boy, I once heard President McKinley say in a campaign speech that he kept his ear close to the ground so that he could hear the voice of the American people. In reality I suspect he kept it about five feet four inches from the ground so that he would not miss a word from Mark Hanna. But, however that may have been, the legislators have now sensed what the people want and that is the significance of President Roosevelt's inclusion in his "second Bill of Rights," "The right to adequate medical care and the opportunity to achieve and enjoy good health," and the Wagner-Murray-Dingell Bills, the first introduced in 1943 and the ancillary Pepper Bill and the more recent Taft-Smith-Ball-Donnell Bill, represent attempts to realize this objective practically. To my mind, President

Roosevelt's inclusion in his "second Bill of Rights," January 11, 1944, of the idea that each citizen had a right to the best medical care quite apart from his financial position is a landmark in the medical history of the country, for the concept is so just, altogether right and feasible, fills so burning a need and was given such prominence through iteration by the late President that there can be no going back. Every plan for medical care since the enunciation of this principle has perforce been aimed, on the surface at least, toward that magnificent goal.

The general objectives in a Utopian medical care program are easy to see but difficult to reach. There must be an adequate number of splendidly educated physicians. An educational system must be set up to keep the physicians of the nation abreast of medical progress. New hospitals and centers of different sizes and functional scope must be dotted over the country according to community needs, and they must be serviced by groups of specialists and must be equipped with laboratories and all the latest machinery of medicine. The study of disease and its prevention must be constantly fostered and extended. Finally, the physicians themselves must be well paid and their lives and work made attractive in order to bring into the profession, which is entrusted with the health of the nation, the best talent possessed. These objectives or principles are at the basis of all the medical care programs in the more socially minded countries and the programs differ chiefly only in the degree of centralization and rigidity with which they are organized. I shall speak of some of these principles presently.

In this country there are great obstacles in the way of realizing the objectives just mentioned. The physical part of the program, that is, the construction of hospitals and centers, is the easiest part. It will not be difficult for the medical schools, if given facilities and prodded a little, to turn out more and better educated physicians. The experience in England and in New Zealand has shown that it is not so hard to give the population at large general practitioner service. The great obstacle—and it is enormously great—is psychological and lies in making physicians and the people, accustomed over years of habit to do something one way, to do it another. It would probably not be so difficult to change the habits of society; the great difficulty is in changing the habits and points of view of the medical profession, that is, to uproot and change over a system of medical care which is the outgrowth of centuries.

Another difficulty of a very practical nature in effecting changes in medical care is that in the profession of medicine itself there is no leadership. I shall come back to this subject later.

In the main, there are two divisions of thought in planning a system of medical care which will suffice to meet the health needs of everyone; one is that a new complete system, covering all the medical care needs of the entire population from "the cradle to the grave" ought to be imposed all at once, and the other that it is wiser to proceed gradually. Those in favor of the more radical drastic course are the supporters of the Wagner-Murray-Dingell Bill, S.1606, 1945. I shall not discuss this bill but merely express the opinion that, if it were passed tomorrow, medical care would be thrown into unbelievable chaos, for the reason that we are not prepared for its sweeping changes. We lack the physicians, hospitals, organization and the appropriate psychological attitude of the profession necessary for success and I do not believe that the people of the country are psychologically prepared for the change. The enactment of the bill now would result in a debacle such as would have occurred if the invasion of Normandy had been attempted at the outset of the war without the necessary troops, training, transport or equipment. Starting from scratch today, it would take fifteen years to become completely ready to meet the requirements of the bill. The dangers and difficulties of imposing revolutionary programs of medical care on an unprepared and inadequate medical organization are illustrated by the experiences in New Zealand which I shall discuss later. Before leaving the Wagner-Murray-Dingell Bill, however, I wish to point out that the bill itself is open to serious criticism. For one thing, it is altogether too highly centralized and rigid. On the other hand, it has great merits: it represents a splendid attempt to work out a medical care program clearly and logically. Its completeness has made it a huge target. It is the product of a fine idealism and it has had a magnificent influence in that it has led both the people and physicians to think, and in the case of Organized Medicine, to fear and to stir a little, for it has been handwriting on the wall. Finally, I express the opinion that in the end the form which medical care will take in this country will not be so far removed from the one outlined in the Wagner-Murray-Dingell Bill, but, I hope, more decentralized and flexible. I say this because in the medically progressive countries of the world the systems of medical care either in operation or projected are of that same pattern and that

pattern seems to be the one toward which the development of medical care is moving the world over.

The second division of thought, holding that it is wiser for us to proceed slowly in the development of a medical care program, is supported by the great majority of physicians. The general thought underlying this view has just been admirably expressed by President A. E. Morgan of Antioch College (Antioch Notes, February 14, 1947): "Social change should combine planning and improvising. We can tentatively plan limited phases of our common life, then watching the effects and taking into account factors first overlooked, we can replan and revise. By this step-by-step process, more than by a grand sweep of theoretical planning, will come a new society." I too hold this view but I am fully aware of the dangers inherent in the policy of trusting to a step-by-step process and I have no sympathy with the attitude of many of my medical friends who believe in doing nothing and trusting to "evolution," meaning thereby really doing nothing themselves to guide change but leaving the guiding to other people—lay groups, theorists and politicians. Evolution means change through the dying out of the unworkable and the survival of the workable. Evolution in this sense goes on all the time, no matter what we do, and determines or undoes in the end the work of mice and men. But it is a very slow merciless wasteful process and now there is no time to delay, for the public will take matters in their own hands through the agency of the government as they have done in England and New Zealand. Witness California at the moment!

But there are excellent reasons for going slowly, if we can only use them! Would it not be foolish to pass such a bill as the Wagner-Murray-Dingell Bill without waiting to see how the National Health Service Bill works out in Great Britain in the first year or two? Then we have before us the examples of Canada and New Zealand, the former setting a splendid precedent and the latter showing something to avoid. I shall refer to these again later. Then there are the Swedish and Russian systems which I should like to discuss now.

The Swedish system of medical care is a combination of State and private practice systems. There is a voluntary insurance system which by 1944 had spread to 42 per cent of the population, but a large number of those who were worst off financially were still not members. Because the voluntary system has not reached the lowest income groups and

because it has been so successful in the case of the others, the government is about to make the insurance system compulsory. The medical students are of the elite of the preparatory schools and the general medical education and preparation for practical work equal the topmost level of medical education anywhere in the United States. Hospitals and centers are distributed so as to be available to all and, also, complete medical services, i.e., including those of the specialists. I now quote from a letter from Professor A. Lichtenstein (Journal of Pediatrics, 28: 503, 1946):

"As can be seen from this account, we have in Sweden a combined system of state and private medical care. The state and the municipality, partly with the help of the sick relief funds, ensures that every sick person, irrespective of his financial situation, has the opportunity of obtaining the best possible medical care either in the hospital or outside. To this end, the best specialists in the country in various fields are available as salaried medical officers at hospital and as doctors for outpatients. The patient has, to a great extent, a free choice of physician. In my opinion, the free choice of a physician is necessary, for the patient, and for the physician, even in the case of members of sick relief funds, which embrace the largest portion of the country's population. The medical profession in Sweden is free, so that the individual doctor can, within a wide boundary, of his own free will choose the place and type of his activities. Even doctors appointed by the State or the municipalities are entitled, in so far as their work at the hospital permits, to carry on their profession with complete freedom.

"This system has, in my experience, functioned well, and on the whole fulfills the wishes of both the patient and the doctor. It is my opinion that a substantial state subsidy and control is necessary, if the health and care of the sick in a country are to function effectively and satisfactorily. The fears expressed by some doctors, that a state activity as regards medical care would hamper or prevent the practicing doctor's exercise of his profession, have proved themselves to be unjustified. On the contrary, the work, for example, of the child welfare centers has increased the interest of the public in child welfare and the care of sick children, and private pediatricians are sought in an ever-increasing degree. Such a development, however, presupposes that the state medical activities are not so organized as to make private medical practice impossible. I fear that should medical activities be entirely controlled by

the state, this would, in all certainty, lead to an unfortunate medical bureaucracy and also to an elimination of the personal contact between the patient and the doctor, which is a necessary condition for all good medical activity. Such a socialization would mean, for the medical profession, a lowering of the standard which is, however, to organize medical care in such a manner that every person, irrespective of his income, can procure the best preventive and curative medical care.

"In my opinion, the Swedish system shows very clearly that this can be done without undermining private medical practice."

Sweden has only 6,500,000 inhabitants (1945) and a geographical area smaller than France, and its population is homogeneous, disciplined and organized. The problem there was simple as compared to ours. Their system is the result of an indigenous growth and cannot be copied, but it demonstrates that it is untrue and therefore sheer nonsense to think that State Medicine and private practice systems cannot get on together successfully and happily or that State Medicine need interfere with the free choice of physician or patient or with the physician-patient relationship. Moreover it shows that through State planning and intervention medical service can be made available to all the lower income groups, not just general practitioner but comprehensive medical care. Finally, the system is approved by the physicians themselves. Professor Wallgren (Wallgren, A. Journ. of Ped. 30: 361, 1947) indeed, states that in general the physicians choose State positions in preference to private practice because of their greater security. I ought to add that in the development of the medical care plan in Sweden Organized Medicine has played a great part and with its almost dictatorial power is instrumental and perhaps the main force in keeping the State System at its high efficiency. I believe that if our medical care system equalled Sweden's we would have no medical care problem.

The trouble with evaluating the Russian system is that, though we know it on paper, we do not know it in operation. But on paper there are excellent features:—One is that there is a highly developed screening process in the education system designed to insure that the physician class have exceptional ability and there is further screening in order to separate out the ablest for the superior medical positions. Another is that the state makes special provision for the continued education of the practicing physicians throughout their active lives. A third is that the State pays the expenses of the medical student during the

years of preparation, so that medical education is open at all economic levels. So far as pregnant women and children are concerned, the health program is perhaps the most inclusive to be found anywhere. Of course the system is rigid and centralized, but the test is what it does for the health of the people and that I do not know.

If we accuse Russia of imposing an iron curtain, we cover our eyes when we look toward Russia with the blinding veil of prejudice. I suspect there is much to be learned from the medical care system of Russia and it is stupid to assume that it offers nothing to us just because we do not like the cut of its ideology. We must beware that in 20 years time we are not far outdistanced by that young, new thinking nation when measured in terms of what a medical system does for the health and security of the people. Dr. Mudd's report, in Science (Science 105: 269, 306, 1947) reveals the biological laboratories of Russia teeming with activities and ideas.

Then we have our own experiments in medical care, those in progress in Maryland, North Carolina, Washington, D. C., New York City, as well as many others scattered over all parts of the country, some started by physicians and some by lay groups. The hope and probability is that one or two of these experiments will emerge as unusually successful and serve as models. Unfortunately, I have not time to discuss these, but their spontaneous birth in so many places in so short a time is a portentous, healthful, promising sign.

A most important step, by general agreement wholly in the right direction, is the Hospital Survey and Construction Act (I shall refer to it as Hill-Burton Act) which is intended to furnish the physical setup for the extension of medical care to the areas of the country where most required. Its general features are excellent. The State survey is essential. The provision that the State can make its own plans based on its survey is admirable, and the limitation of the Federal role essentially to standards and guidance is as it should be. Under it the states have the desirable autonomy and yet the federal government has enough power to make certain of a carefully integrated and coördinate state and national plan. In brief, the balance between state control and federal control seems just and right. Then also it is a happy arrangement that the United States Public Health Service has the administrative assignment, for that splendid agency possesses uniquely the knowledge, organization and high ethical standards required for this particular purpose. I know

from experience that the United States Public Health Service can be of the greatest help in furnishing hospital plans. Finally, the establishment of the hospitals and centers is an absolute requirement if the very latest developments in Medicine are to be made available to all the people in the country.

But the Hill-Burton Act has some rather glaring deficiencies. It has no provision for federal funds to aid in the maintenance of the hospitals once they are constructed, and it has the same matching requirement for the poor and the rich states. This last means that the areas of the greatest need, the more rural states and communities and those with less wealth which should profit the most, are in actuality discriminated against. While the federal funds are allotted to the states in such manner that the poorer states may receive larger proportions of the amounts available, the result of requirement for uniform matching is that the poorer states are less able to take advantage of the federal offers. Thus no real equalization has occurred.

Bill S 545, introduced by Senators Taft, Smith, Ball and Donnell, I shall refer to as the Taft Bill. It is at the opposite extreme from the Wagner-Murray-Dingell Bill and is obviously written to appeal particularly to those to whom Federal control is anathema. The Taft Bill vests essentially all the authority in the individual states and reduces the Federal control near to impotence. If the Wagner-Murray-Dingell Bill was carefully thought through and made to face issues squarely, the Taft Bill is poorly thought out and avoids controversial issues, except for its central thesis of states' rights, by passing them on to be fought out in the individual states. It contains provisions fraught with peril. For example, the Bill provides that "no plan or modification shall be disapproved because the (Federal) Director disapproves of the methods proposed." This would probably be interpreted as prohibiting the establishment of Federal standards which a state would have to meet in order to have its program approved. Virtually all of the existing health legislation requires the establishment and maintenance of personnel standards on a merit basis. Such Federal legislation has been a most important factor in taking politics out of Health Department appointments. Such a merit system clause was in the original Taft Bill introduced last year, but its omission is conspicuous in the present bill. The removal of this would open the State programs to political appointments. Proposals in the bill would allow the State to purchase services through any non-

profit voluntary insurance program without any standards whatsoever. This would permit state and federal funds to be used to subsidize poorly operated voluntary insurance programs. Moreover, within the National Health Agency seven units are established, one of which is the new Office of Medical and Hospital Care Services. This unit is administratively entirely separate from the United States Public Health Service and the Children's Bureau, i.e., the existing federal health agencies have been completely by-passed. This arrangement creates obstacles in the way of integrating preventive health services and curative health services. If the bill were passed as it stands, there could be as many different systems of medical care as there are states. Some of these in the more progressive states would probably be very good, in some other states exceedingly poor and all would be laid open to the possibility of political intrigue and inefficiency. If the passage of the Wagner-Murray-Dingell Bill would produce chaos in medical care, the Taft Bill would produce national confusion and perhaps corruption and would establish an inefficiency from which it might be impossible to recover. It would span the way to the perpetuation and extension of the poor features of the present system of medical care without the assurance of new good features. The bill has other questionable provisions, one of which having to do with a proposed extension of voluntary insurance to the medically indigent groups, I discuss later. But the bill is an example of careless thinking, or not thinking at all, and the fact that such a manifestly inferior measure could be proposed by our legislators is depressing to those who perceive how glorious a medical care program might be.

If it is wrong to give all the power in health legislation to the Federal Government, it is worse to place it all in the states and to have no national integration or coördination. In determining Federal and State relationships there must be a happy medium, in which the Federal Government establishes the general scheme and fixes minimum standards and the states have freedom to develop their own systems within the Federal structure. The plan for compulsory health insurance which the Canadian Medical Association has recommended to the Canadian Government is in such marked contrast to the Taft Bill in the wisdom with which the Federal-Provincial relationship is arranged. Their recommendation (The Medical Profession and health insurance. A submission to the Special Committee on Social Security of the House of Commons

by the Canadian Medical Association 1943) reads: "If Provincial autonomy is to be maintained as suggested above, it is extremely important that a sufficient degree of federal control be retained. This control should be limited to such matters as the extent and the standards of the services, as indicated previously. It is important, however, that control be maintained as it is only through this means that a satisfactory degree of uniformity can be obtained. Unless there is considerable similarity in methods and program in matters of disease prevention and control, the results from the national viewpoint will be jeopardized.

"On this basis it is recommended that the federal administration be under the Minister of National Health, with an advisory Dominion Council on Health Insurance. . . .

"In the provinces it is strongly recommended that the plan come under a NON-POLITICAL INDEPENDENT COMMISSION which might be responsible to the legislature through the Provincial Minister of Health. . . .

"Among the details left to the Provinces might be the income level below which the residents would be included under an obligatory plan of insurance, the rate and method of payment for all services, professional and institutional, the best means of obtaining full preventive and public health services within the provinces and the particular means which might be necessary to safeguard adequate teaching in the medical schools and teaching hospitals." (J. Pediat. 3:228, 1947)

The Taft Bill contains a suggestion that voluntary insurance be extended to the medically indigent through the use of tax money to pay the cost of coverage in voluntary prepayment plans. This raises the topic of insurance under public auspices, supplemented, as necessary, from general tax revenues. It is probably the best method for financing complete coverage for medical care for the entire population of the nation. Its merits, as an immediate measure, will be discussed by Dr. Ernst Boas in the April number of the Journal of Pediatrics. As just stated, the Canadian Medical Association recommended in 1943 to the Canadian Government a compulsory health insurance system which could be made to include everybody or only those in certain income levels according to the determination of each province. I do not believe that we in this country are yet prepared for universal health insurance, either psychologically or materially. The enactment of universal health insurance, without an intervening period of planning, would throw the full weight of providing necessary care for the entire

nation upon our present limited resources before they have been built up to the required strength. If, however, a Federal-State health insurance scheme supplemented, when necessary, from general taxes were made available to the low and middle income groups, the burden on the physicians and medical care resources of the country would still be great, but, perhaps, not too great, if time were granted for planned gradual adjustment.

Voluntary insurance has been taken up by the public like wild fire. The Blue Cross has now 24,250,000 subscribers, one-fifth of the population of the country, and prepayment medical care schemes such as those offered by medical and consumer groups have been extended considerably. But practically all voluntary insurance plans supply only partial medical care and that for only a limited period of time in the sense that they cover only catastrophic illness and they do not provide for preventive medical care. These deficiencies are tremendous and keep the present plans far from meeting the total need of even those financially able to subscribe to them. Moreover, the plans are circumscribed by specific factors, such as occupation, economic status, residence, race, etc. Nevertheless, the voluntary hospital insurance plans have been a great benefit and their popularity indicates that the prepayment principle is generally desired. My medical friends, and they are many who favor a hands-off waiting policy in regard to the development of medical care, advocate voluntary insurance spread until it reaches everyone who needs it. But it is obvious that voluntary insurance can never spread to those who need it most, namely, to the low income groups, for they can never afford it. Furthermore, experience shows that plans offering complete medical coverage are necessarily too costly for most families, even those in the middle income groups. This accounts for the slow growth of voluntary medical service plans.

Returning now to the Taft Bill, it suggests undertaking to provide care for medically indigent persons through payment of insurance premiums with tax monies to all types of non-profit voluntary plans. This would appear to be a policy based on fallacious reasoning since it would involve inappropriate use of public money and would be unsound governmental procedure. It is a long-established principle that tax monies should be expended by public agencies which are accountable to public officials representing the tax payers. This is a basic principle in the organization of our government and hence a vital consider-

ation against the Taft Bill proposal aside from the fact, as I have pointed out above, that voluntary plans do not generally assume responsibility for meeting more than the very partial medical needs of their members. It seems astonishing that Senator Taft and his associates should have allowed to be introduced into his bill a suggestion flaunting this time honored principle.

In any prepaid medical care program in which the care offered is to cover all requirements the method of compensation of physicians is of great importance, and since our present medical care system is founded on a sliding fee-for-service remuneration, I shall briefly discuss the fee-for-service method of reimbursement and give the experiences with it reported from New Zealand. The fee-for-service method of payment of physicians has the great merit of stimulating competition, and this is its virtue. However, it has serious drawbacks: Most important it stands in the way of preventive medical care, for the obvious reason, as previously mentioned, that, if a person has to pay a physician for his visit, he will not go to him until sick. The method interferes more than anything else with the naturalness of the patient-physician relationship. It is not democratic, for it creates economic and social distinctions. High priced physicians in the main have rich patients and low priced physicians the poor and the low priced physicians in consequence are the ones who carry the great burden of charity and are not so well equipped to do first quality work in consequence of heavier load and poorer facilities. Moreover, the method of payment stimulates avariciousness and breeds fee splitting. In short, it is the chief cause of criticism or of actual charges against the medical profession. Finally, as previously pointed out, it gives a wholly wrong distribution of medical care. When it is introduced into a prepaid complete coverage medical care plan or one based on direct payment by the State for service rendered, it is difficult to control and is likely to wreck the system. The New Zealand experiment in medical care illustrates the difficulties caused by the fee-for-service variety of payment.

The New Zealand plan in brief is that the government provides medical care for everyone by paying for medical and pharmaceutical benefits according to fixed rates. The fee-for-service or "direct claim" system was intended by the government to be the standard and has been the one chiefly used, though capitation and salary reimbursement have been employed to some extent. Under the fee-for-service system the

patient signs a form stating that service has been rendered and the physician sends in the form to the health department and receives 7s 6d per service. This is the ordinary arrangement but many physicians have used a so-called "Refund System" or "Token System" which makes the patient add 3s from his own pocket, so that the physician nets 10s 6d per service. I shall not discuss the arrangements for specialist or laboratory services, but with this brief explanation will quote from my informant, a prominent physician in New Zealand, whose name I shall not give because in a communication just received I do not have his permission: "Under these schemes the doctors have become extraordinarily prosperous. It is comparatively easy to work up a good income almost anywhere except perhaps in rural districts where a lot of travelling is still necessary. Actual figures of doctors' incomes are not published, but some which are almost fantastic are commonly mentioned in parliament. The highest rewards are obtainable under a company arrangement, where the principal can pay handsome salaries to juniors and still reap rich rewards. The individual man can make a big income by dint of hard work and organization. . . From the doctor's point of view perhaps it is a good thing that by ordinary work he can secure very adequate rewards. . . . The emphasis is placed on the number of acts done rather than on quality. Indeed we find the doctor personally doing a number of trifling things in his practice that ought to be done by a nurse or secretary, but are not so done because it is worth 7s 6d a time to the doctor, if he does them. . . . The poor man's cough is now as profitable as the rich man's and certain areas both urban and rural, formerly poorly served, have now medical men on the spot. So far so good, but a further effect is to concentrate medical men in the cities as against country districts where travelling is greater. . . . Moreover, as between general practice and specialists, scientific and teaching work there is a disproportionate attraction to the former. The pathologists, radiologists, hygienists and teachers in the profession are almost all maintained by salary and are the Cinderellas in the financial sense. . . . The quality of service suffers under the fee-per-service structure with its emphasis on quantity rather than quality. The tendency is toward quick superfiicial work and the avoidance of difficult subjects, times and places."

According to the New Zealand system the patient pays nothing for pharmaceutical benefits—merely hands in his prescription and counter-

signs it when he receives his bottle. The total cost of pharmaceutical benefits has risen steadily and now reaches almost fantastic proportions. For the fiscal year 1945-1946, the cost to the government for payment to physicians was 1,633,514 pounds and the cost to the government for pharmaceutical benefits was 1,133,366 pounds, a figure only one-third less. The enormous proportions of the expenditure for pharmaceutical benefits reveals what must have happened, namely, the doctor reverted to the old method of satisfying the patient in the quickest way by giving a prescription. I believe it will be difficult now for New Zealand to extricate herself from the poor system on which the general practitioners have grown fat.

The New Zealand experiment teaches lessons: First, the medical care program was thrust on the country by the Labor Government without adequate consultation with medical groups. A chief reason for this was that Organized Medicine there was not conciliatory to change in medical care, like the British Medical Association in the Lloyd George regime and Organized Medicine in this country now. Thus, the medical care program was poorly thought out and designed. Second, it was commenced before the organization for medical care the country over was able to cope with it; i.e., it sought solution by removal of economic barriers alone. Third, the rank and file of general practitioners profited, as is bound to be the case in any medical care system in which the medically indigent become medically solvent and as they will do in this country as soon as the medically indigent group ceases to exist as such. It is astonishing that practicing physicians in this country do not see that their incomes will be increased the moment the medically indigent group becomes a secure source of revenue. But before leaving the account of the New Zealand experience with the fee-for-service method of reimbursement I ought to caution against the impression that the medical care program there has been a failure. Whatever its defects in administration, it has made general practitioner service available to all and must have given feelings of security difficult to evaluate to low income groups particularly by removing the specter of pauperizing illness. The total success or failure of a medical care program can be measured in just one way, its results on the happiness and health of the people.

It is obvious that a *sliding fee-for-service* method of payment—I refer to our present system in which the physician has the right to

charge what he thinks he can get—would vitiate and hence be unworkable in any prepayment scheme which undertakes to furnish complete coverage medical care. But a regulated fee-for-service system has been used in Sweden successfully. However, I personally doubt if even the *regulated fee-for-service* method can be used successfully in any large prepayment program *including all medical services* in the complex conditions of this country because it is so easily abused and difficult to control.

I shall not discuss other systems of payment to physicians in nation-wide health plans except to say that in New Zealand and in England physicians on the capitation method of payment have liked it and capitation has some advantages, particularly in promoting preventive medical care. It is planned to try it in Baltimore for the care of the indigent as part of a plan which is highly original and has great potentiality. I wish I had time to describe it. Probably in any nation-wide medical care system all three methods of remuneration—controlled fee-for-service, capitation and salary—ought to have their places.

I now come to a subject which seems to me of great importance, namely, the participation of the medical schools in medical care plans, but I have time only to touch on it here and there.

First, there must be more physicians to cope with the increased burden of medical care under any plan which includes full care of all the people. Dr. Parran has supplied some figures in this regard. The medical schools of the country now turn out about 5,200 graduates a year. Adding the 7,000 graduates accrued as the result of accelerated war education, there would be produced in the next 20 years, i.e., by 1967, 111,000 physicians. During the same 20-year period, 77,000 would be lost from death or retirement. This gives an estimated net gain by 1967 of 34,000 physicians. But the gain in population by 1967 will require 27,000 additional physicians to maintain the existing ratio of physicians to population. This reduces the net gain in 1967 of 34,000 physicians to 7,000. But a whole variety of unrelated factors, such as specialization and the increased complexity of medicine, the spread of pre-payment plans of medical care, the inclusion of the medically indigent, the supply of the newly created health centers and hospitals, etc. all unite to increase the requirement for physicians above the present physician-population ratio. To meet this, Dr. Parran calculates that by 1967 our medical schools must produce nearly 50 per cent more

graduates than at the present time, i.e., 7,800 instead of 5,200. It follows that either the capacity of our medical schools must be increased or else new ones must be created. There would be great opposition at Johns Hopkins to any large increase in the number of medical students because of a lack of expandable teaching facilities, and this attitude probably prevails in the other full-time medical schools. I personally hope very much that the increased demand for physicians will be met by the formation of new full-time medical schools which could then be placed in the areas of need just like the new hospitals and medical centers to be constructed under the Hill-Burton Act. But I might remind you that though new hospitals and centers can spring up in 2 years, from 7 to 10 years at the least would be required to furnish the 50 per cent additional quota of physicians, and this means that to attain Dr. Parran's 50 per cent increase in the number of physicians by 1967, it will be necessary for the medical schools to plan on turning out 100 per cent more graduates immediately, i. e., double their admissions at once.

Second, our medical students should be better selected. The health of our people is so important that physicians should be as fine and intelligent a class as we possess. The standards in medical education ought to be high and the inducements to a medical career made great.

Third, medical education should be extensively reorganized and improved in two parallel ways. First, it should be integrated much more closely with public health and the student taught to regard the prevention of disease to be as much his duty as the care of the sick. In the list of objectives which the Canadian Medical Association adopted for presentation to the Canadian Government the first on the list is "The Promotion of Health and the Prevention of Disease." Preventive medicine, or the proper attitude toward it, cannot be taught by placing in Medical Schools separate departments of Preventive Medicine. Why not establish separate departments of Therapeutics? Preventive Medicine is an every day, every hour, every minute part of clinical medicine and must be taught by clinical teachers themselves in connection with their cases and daily work and the teachers of clinical medicine themselves must learn the new philosophy. Then the teaching must be reorganized so as to give to the student a broad social viewpoint, so that he can join in a concerted effort to furnish medical help in all aspects to all people with intelligence and enthusiasm. Finally, practical training in hospitals or centers should be at least three years, making the

total period of preparation 7 years before risking a young doctor on the community.

Fourth, the private medical schools must have State aid. At Johns Hopkins the tuition is $600.00 a year. The cost to the Medical School of the education of the student is $3,900 per year. With the shrinking resources and the disappearance of the old private supports and without the addition of new, the full-time medical schools cannot continue.

Fifth, the State must aid the student financially because of the long costly preliminary years of preparation, if medicine is to attract the finest of our young men. During his 4 years in Johns Hopkins Medical School, the cost of the support of the medical student, apart from tuition, is from $1,300 to $1,500 a year. During his hospital training as intern, he receives no stipend. Only to those who command financial resources and can wait the years of preparation is a medical career open. If the State salaried the young doctor during his three years of hospital experience, a great part of the load would be lifted and after that was over it would be fair for the State to draft him on a salary basis for two to three years for some rural community where physicians were required. This idea is suggested in the proposals of the Canadian Medical Association to the Canadian Government. A somewhat similar plan has been introduced into the medical care scheme of North Carolina. The plan would be similar to that now in operation in our Naval and Military Academies.

Sixth, I now come to an idea of the greatest importance, namely, that the medical schools must agree to extend their teaching obligations to the practicing physicians. One of the worst features in our present system of medical care is that practicing physicians of the community have no means of keeping up with medical progress and in consequence are left in intellectual, quickly turning to spiritual, stagnation. Of course, many of the more progressive practicing physicians go to medical schools for refresher courses yearly or attend medical meetings, where practical surveys of various topics in medicine are given by experts. But the education of practicing physicians ought to be organized so as to be a regular part of their professional lives. Of course, medical schools could offer refresher courses but by general admission this method is not the best way to teach. The method which has tremendous possibilities is for the medical schools to extend their activities into the subsidiary or satellite hospitals and centers created by the Hill-Burton

Act. I do not know quite how the plan could be best worked out, but I suggest that the Medical Schools send to the satellites on some rotation plan groups of their able, splendidly trained specialists in internal medicine, pediatrics, x-ray, pathology, biological chemistry, etc., with the understanding that these men act in them as heads of the general services in their respective fields, consultants and teachers. These emissary representatives of the medical school faculties would be full time on salaries and would not compete with local physicians. The salaries would have to be good ones. and furnished to the Medical Schools by the State, for the Medical Schools must be given complete freedom. I also suggest that the Medical Schools supply the satellite hospitals and centers with interns, who would work under their emissary preceptors from the Medical School just as at the home hospitals. By general agreement the finest medical care anywhere in this country is that furnished by the Medical School Hospitals and the suggestion made would give the remote communities that same splendid level of care. The teachers assigned to the satellites could give clinics and systematic instruction of various kinds to the practicing physicians, and, much more important, could go over their patient problems with them in the home, out-patient clinic, ward, operating room or laboratory. There is no teaching so good for teacher or student as case teaching. This extension of the Medical Schools to include the education of the practicing physicians would have the greatest influence I can conceive of in raising the morale, the standards of work and the enlightenment of the medical profession of the nation. I make one further suggestion, that if the private medical schools will not or cannot enter into this plan, the State subsidize the State supported Medical Schools and create where needed new full time State Schools of Medicine whose particular duty it will be to organize instruction for the practicing physicians which will keep them abreast of medical progress.

A participation of the Medical Schools in medical care is envisioned in the National Health Service Bill for England and Wales.

As intimated, the policy of gradual development of a medical care program has its perils, and the perils are that the moves forward will be in wrong directions or will lead into pits, like the thinly concealed ones in the Taft Bill, or remain isolated when they ought to be coördinated. Gradual development is the best policy provided it is carefully thought out, but is dangerous if not thought out at all. Take the Hill-

Burton Act for example. This was designed to make available the latest advantages of group medicine to the needed areas. Where will the specialists who are to form the groups come from? They will not spring from a ground sown with dragons' teeth like the robot warriors in the fairy tale. They can't be enticed to rural areas by the prospects of large fees. If the attraction must be good salaries, then a little planning could bring the wonderful uplifting influence of the medical schools into the program. Again, the construction of the hospitals and the centers makes at once an increased demand for physicians; yet, as pointed out, physicians, in particular specialists, are seven-year products at least, and yet no steps have even been contemplated to increase the output of the medical schools. Granted that it is impossible now to think through the problem of medical care to the very end, it is certainly possible to think a considerable way into it and some requirements are common to any comprehensive medical care plan, and are as evident now as 20 years away. There is no planning in what is going on now and this is because there is no medical leadership. The movements, such as voluntary insurance and the isolated experiments in medical care, were born in the minds of enterprising, socially-conscious groups of physicians or lay organizations working outside Organized Medicine. If Organized Medicine had been responsible for these isolated attempts, even if unable to formulate any complete program of its own, it would have much to its credit. Organized Medicine should have furnished the leadership, but not only has it not shown leadership, but has opposed important developments, which have gone on, none the less. But in spite of its dead weight Organized Medicine, resisting on occasions, has been dragged forward by the sheer power of outside opinion and the force of example elsewhere a long way since 1938, when it tried to block the formation of the Washington Group Health Association, until now it endorses the non-profit prepayment or voluntary insurance principle and recognizes the necessity under certain conditions of Federal Aid in medical care plans. But its much touted "Ten-point program" is no program in any original, dynamic or constructive sense, or, indeed in any sense, but only a series of pious platitudes and highly qualified endorsements of policies or activities, initiated in the first instance by isolated groups of liberal minded socially conscious physicians or laymen working independently of it. Its primary concern throughout as judged by its behavior has seemed to me to be aimed consistenlly at the preservation at

all costs of the medical care system as it exists today. Disturbed, it cries out in the words of Fafnir coiled around his treasure, when the youthful Siegfried, the personification of the new order, approaches with his magic sword, "Lass mich schlaffen."

In this critical period of change, when the handwriting appears on so many walls, the behavior of Organized Medicine is humiliating, and its leadership has seemed incredibly stupid and in such contrast to the up and coming progressive attitude of the Canadian Medical Association, which has boldly and unqualifiedly taken the leadership and presented to the Canadian government their own plan for a system designed to provide comprehensive medical care for everyone. When I asked a prominent Canadian physician how it happened that the Canadian Medical Association was so open- and liberal-minded, he replied:—"We saw what was coming and decided it would be better to develop our own program, one which we liked, rather than to have one forced on us." He remarked further, "We have some big leaders." I think that Dr. Fishbein has had an opportunity, such as comes to few, to lead Organized Medicine in our country in a program of medical care which would have been a monument to an enlightened and progressive spirit, but he chose the opposite course, the course popular and easy at the moment but not the one destined to appear creditable in history. Without leadership it is impossible to concert a plan, but I express the view that fresh legislation should be introduced into Congress along a middle ground between the proposals of the Wagner-Murray-Dingell Bill on the one side and the Taft Bill on the other, legislation which among other things would give the Federal government enough authority to develop and maintain the general structure and standards of a comprehensive medical care system but would allow the individual states freedom to develop their own programs within the general outline; which would preserve private practice, as it now exists, for the upper income groups but would make medical care available through a *government* insurance scheme to the lower income groups, not merely general practitioner service but the most intelligent broad reaching medical care which scientific progress and specialization through group practice have now made possible anywhere and which, finally, would augment and implement existing medical schools and establish new ones in needed areas, so that they could turn out annually the requisite number of excellent physicians and could assume regionally the continuous educa-

tion of the practicing physicians as a regular part of their duties preferably through extension into the newly created hospitals and centers.

A few weeks ago President Truman requested the Federal Bureau of Investigation to investigate all government employees in order to discover and eliminate Communists. I sometimes think that governments are more in need of psychiatrists than are individuals. The way to free this country from Communism is not, in my humble opinion, by Gestapo espionage and persecution, methods which history has shown over and over and over again merely drive idealogies underground and by repression and dispersion give them increased impetus, but to make our own people so much better fed, housed, clothed and educated and happier and freer than others that Communism will wither and die for lack of soil of misery and discontent to grow on. I can think of no better beginning than with the least possible delay to reorganize medical care so that in full measure and in most modern kind it would be available to each citizen with all its benefits.

THE ETIOLOGY OF BENIGN PROSTATIC HYPERTROPHY*

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THROUGHOUT every one of the branches of medicine there runs an identical methodology in scientific development which is so similar that it must be considered as a basic pattern of human thought which man is conditioned to use as he investigates the unknown. The evolutionary stages are historically as well as in order of increasing importance, Speculation, Observation and Experimentation. In considering a subject it is well at times to reflect on which stage one finds himself and how important that phase may be with reference to the others.

Consideration of the etiology of disease entered medicine as a late and sophisticated development. Early man, no doubt attempted by preference to cure his pain and malaise through mystical means and when these therapeutic agents often proved to be erratic and capricious he reluctantly turned to more earthy methods. I presume that the first attempts at treatment were considerably later superceded by primitive diagnosis since some sort of a classification seemed to be helpful if not prerequisite to therapeutics. The classification of illness naturally led to thought about the causation of disease.

What is the etiology of benign prostatic hypertrophy? There was much early speculation about it and many theories have invoked such diverse factors as venereal disease of the several sorts, inflammation, arterio-sclerosis and various human sexual habits as well as celibacy. The causation of disease is not nearly so simple as it seems at first glance. In a few fields one can give succinct although sometimes superficial statements of etiology. For example, it is easy to state that a waxy bacillus is the cause of tuberculosis and that a green streptococcus is the inciting agent in sub-acute bacterial endocarditis but even here such

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things as resistance of the host complicate the problem in certain individuals and species.

The etiology of prostatic hypertrophy seems to be particularly difficult to investigate since many of the characteristics of the disease are peculiar to man. Since experiment thereby is greatly limited we are largely thrown back on observation so that concerning the cause, of the enlarged prostate only an approximation can be given at this time. I wish now to consider how far contemporary morphologic and functional knowledge can provide a limiting frame in which the etiology should fall.

Benign prostatic hypertrophy so far as is known occurs only in man and dog and it has not yet been successfully induced in the laboratory. Probably any attempts at experimental production should involve the dog as the experimental animal; it is a fundamental dogma of the laboratory that any disease which occurs spontaneously can be experimentally reproduced but unnatural disease may be something else again. The disease differs in man and dog. Canine prostatic hyperplasia in essence is a cystic hyperplasia of epithelium. The cause of the cysts is not ductal obstruction since plugging the ducts with a graft of striated muscle[1] although producing cystic change does not result in hyperplasia. Also the injection of India ink into the dilated cysts of spontaneous cystic hyperplasia reveals that the ducts are patent. Always tall columnar epithelium is present but its functional capacity is damaged. The prostatic secretion in canine prostatic hyperplasia is identical with that of young adult normal dogs but the volume is greatly reduced. A fist sized canine prostatic hyperplasia (100 grams) secretes much smaller volumes (2-5 cc.) than does the 10 gram gland of a normal young adult (30-50 cc); but each prostate produces the same type of fluid.

Canine prostatic hyperplasia is under androgenic control. The disease does not occur in castrates. Testicular excision causes prompt atrophy[2] and differing from the hypertrophy of man, where the effect is slower, profound involution of the tumor occurs promptly after estrogen. Dogs feminized by estrogen produced by Sertoli cell tumors of the testis[3] have been extensively investigated; they never have canine prostatic hyperplasia. The disease only occurs in old age. Nearly all ancient dogs (objective evidence—worn teeth and cataracts) with functioning testis[2] have this disturbance. Age itself does not confer on prostate gland the necessity for epithelial proliferation. We have injected androgen,

testosterone propionate, 10 mg. daily for 3 months, in 3 dogs known to be older than 16 years and castrate in early life; in each case a normal prostatic gland with no signs of cystic hyperplasia resulted.

We deduce from all this that androgen and senility are important factors in the hyperplasia of dogs and that the senility factor is not a matter of chronology alone. The time component is the expression of continued stimulation by androgen over long years. The evidence for cystic hyperplasia being a neoplasm is presumptive but not clear cut in the dog.

It is well now to consider the following facts and their interpretation concerning the prostatic hypertrophy of man.

1. *The lesion is composed of spheroidal neoplastic nodules.* It is not an hypertrophy at all; however smooth the lesion may appear in the gross, spheroidal masses are invariably found on dissection. The nodules are always multiple. At times the right and the left sides of the prostate are asymmetrically involved, a larger nodule being present in one portion than the other; however nodules are always found in each side of the gland and a single spheroid in the prostate must be a rarity.

The spheroids usually are composed of 3 elements, epithelium, smooth muscle and fibroblasts; less often epithelium may fail to be present. Strictly, multiplicity of nodules in pathology indicates only that there are multiple centers of origin of the lesion. Since pure myomas and fibromas occur in addition to the characteristic epithelial containing growth it may be deduced that the spheroidal nodules of the prostate are benign neoplasms. Further benign prostatic hypertrophy[4] has an appreciable aerobic glycolysis (Q_LO_2 2.21) and possession of this metabolic pathway is one of the characteristics of tumors. The content of citric acid, aconitase[5] and acid phosphatase in the prostatic adenoma is not impaired. In many respects the spheroidal disease of the prostate resembles fibroid tumors of the uterus except that epithelial proliferation is absent in the latter. Incompletely removed neoplasms usually regenerate and this explains the bad results of transurethral resection where it is impossible regularly or indeed frequently to remove all of the spheroids.

2. *Growth of the human prostate is not finite.* In his study of 733 human prostates Teem[6] quaintly but accurately observed "The prostate reached the adult size in the third decade of life, and from then on the curve for the average weight gradually rose." Benign prostatic hypertro-

phy was observed in 5 instances by Teem between age 30 and 39 years. Moore[7,8] did not encounter the disease before age 39. The disease increasingly affects the prostate with increasing age to the limits of life. In Moore's study 75-80 per cent of all men after 80 years of age had prostatic hypertrophy. The age influence is expressed in a homely way in the saw that "children have all of the urologic diseases of adults except pyelitis of pregnancy and benign prostatic hypertrophy."

3. *Only the medullary region of the prostate is involved by benign prostatic hypertrophy.* Tandler and Zuckerkandl[9] first expressed the concept that the disease is essentially pre-spermatic in origin and involves the periurethral regions exclusively and that the posterior region of the prostate does not become the seat of hypertrophy. It was the opinion of these scholars that the original lesions arose as budding of sub-mucosal glands of the urethra. Reischauer[10] and later Moore[8] stated that the earliest lesion was a sub-mucous nodule of stromal cells which were devoid of elastic tissue. Reischauer believed that the fibro-myomatous tumor often became invaded by epithelium. These findings are not consonant with our observation that the spheroidal nodules may arise in any part of the prostatic medulla.

Although the prostatic glands arise as buds from the urogenital sinus, it has been clear that a duality of structure exists in the prostates of many species. In the guinea pig and rat[11] as well as the monkey[12] a specific region of the prostate exists which is able to induce coagulation of the seminal vesical secretion. Further in the rat and mouse[13,14] this area—the anterior prostate or coagulating gland, responds differently to estrogen from the main body of the gland; the acinar epithelium becomes transformed to squamous cells in the anterior lobes while the dorsal and ventral lobes remain uninvolved.

In the dog the response to estrogen is clear cut in varying portions of the gland; only the posterior or dorsal segment of the gland responds to estrogen[15] by forming squamous metaplasia. In the presence of injected estrogen and androgen the ventral portion of the canine prostate responds by forming tall columnar epithelium while the posterior region undergoes squamous transformation.

In his classic embryologic study of the human prostate Lowsley[16] observed that the posterior lobe of the prostate arose as an independent structure originating from the floor of the urethra below the ejaculating ducts.

In man prostatic cancer usually arises in the cortical region of the prostate[17] and the difference in the type of tumors arising in the medullary region seems to indicate a fundamental difference in regions of the gland. Apart from the different types of neoplasms occurring in these regions of the gland, physiologic proof has been difficult to obtain concerning the duality of the human prostate. Subtle but definite effects are observed after estrogen administration which I shall present in a moment revealing regional differences in the human prostate.

Aside from the differentiation of the prostate into cortical (posterior lobe) and medullary portions (inner prostate, periurethral region), the prostate does not seem to have other lobes. At the present time a "median lobe" is commonly described but the terminology is inexact. Our observations coincide with those of Swyer[18] who states—"In most cases the fibroadenomatous nodules of early prostatic hypertrophy are found only in the lower parts of the prostate, and it is by the upward extension of these nodules that intravesical projections are generally formed. Rarely the projections take the form of a more or less complete collar around the internal urethral meatus, but it is much more common to find a median knob, often referred to as the uvula vesicae, behind the meatus. Very occasionally, a uvula vesicae may exist without there being any evidence of hyperplasia in the lower parts of the prostate; these are the cases of true subcervical or subtrigonal lobe hyperplasia." In most cases the median lobe or uvula can be traced to a lateral adenomatous nodule.

4. *The androgenic relationship.* Constantly in benign prostatic hypertrophy the prostatic epithelium consists of tall columnar cells 16-28μ in height.[19] In the dog and the rat castration causes a prompt decrease of height of the cell, which is restored by androgen. In man orchiectomy causes a decrease of cellular height and epithelial atrophy in the benign hypertrophy but at a rather slow rate compared to the laboratory animals. The epithelial cells were only slightly reduced 29 days after castration but marked atrophy was observed[19] at eighty-six and ninety-one days.

Orchiectomy produced a considerable relief of obstructive symptoms and a decrease in the size of the prostatic hypertrophy in our cases. However enucleable spheroids of muscle, fibroblasts and atrophic epithelium were present so that the neoplasm did not disappear—it merely shrank in size. Of importance in the etiology of benign hyper-

trophy is the fact that it has never been observed in man from whom the testes had been removed in early life.

The effect of estrogen on the prostate requires special comment. In the dog estrogen results in a rapid cessation of secretion and profound epithelial atrophy with pronounced epithelial metaplasia of the posterior segment of the gland. In man the effect is much less and slower. Moore and McLellan[20] injected estrogen for ten to thirty-one days in five patients with benign prostatic hypertrophy and observed an increased stratification of the transitional epithelium in the ducts and urethra; the acini and stroma of the nodules of benign hypertrophy showed little effect of the estrogen. In our experience with man estrogen administrated in dosage sufficient to cause breast growth (e.g. diethyl stilbestrol 130 mg. in fifty-seven days, of which 70 mg. were injected intramuscularly) caused no decrease in the amount of enzymic concentration of prostatic fluid; definite changes were observed in the acini of the inner prostate and none in the posterior lobe. In the acini of the medulla of the prostate a paleness of the cells, vacuolation and signs of mild injury such as a shift of the nucleus to the middle of the columnar cell were observed contrasted with the normal epithelial cells of the cortical prostate.

Discussion

In the hyperplastic prostate of dogs the lesion is primarily a great epithelial growth conditioned by 2 factors, the testis and time. Fibromas and myomas have not been observed. The epithelium is inefficient since the prostatic secretion is much reduced in quantity though qualitatively similar to the secretion of a normal young adult.

Since hyperplastic epithelium is the basis of the canine overgrowths theory suggests that the epithelial cells are the basic factors in the human prostatic enlargement. In most cases in man the lesion is an adeno-fibro-myoma; in those cases of pure myoma or fibroma the earlier presence of epithelium which has been "choked off" cannot be excluded. The nodular character of the process and its respiration indicate that the disease is a benign neoplasm. Since the prostate has the peculiar property of continued growth the frequent presence of abnormal growth processes is not unexpected.

In man the disease involves only the medullary part of the prostate. Comparative physiology has shown that there are 2 functionally dif-

ferent areas of the prostate in mouse, guinea pig and monkey. The evidence that the human prostate is composed of 2 different regions, apart from the capacities of the posterior lobe and the medullary region to form differing neoplasms, is based on differences of embryologic origin and response to estrogen of these regions.

Certainly in both man and dog prostatic enlargement is related to a stimulus acting for a very long time since the disease does not occur in early life. Presumably the stimulus is of testicular origin since the disease does not occur in the absence of the gonad. Obviously androgen is a basic factor in development if not the actual cause since tall epithelium is invariably present in the gland in prostatic hypertrophy, and the disease does not occur in feminized dogs. Also castration causes shrinkage[21] of this neoplasm which has never been known to develop in castrates. Finally androgen itself is a powerful stimulant of growth of selected cell areas.

It must be pointed out at this time that while estrogen is involved in the genesis of many tumors, androgen as yet has not been implicated as an inciting agent for tumors in any experiment.[22]

It is proven that androgen is a basic element in the etiology of benign prostatic hypertrophy. However in man in old age at a time when prostatic tumors are growing well there is a decreased secretion of androgen. Rusch and Kundert[23] first showed that the androgen excretion of men with prostatic hypertrophy is significantly lower than that of young males. Dingemanse and Laqueur[24] observed that both the urinary estrogens and androgens were less in men with benign prostatic hypertrophy than in old men without this lesion. The reduction in the amount of urinary androgens in old age has been confirmed by other groups[25, 26, 27] using both the comb growth assay technique and the Zimmermann reaction for 17-ketosteroids. Teem[6] found that the number of Leydig cells in the testis of men with benign prostatic hypertrophy is relatively reduced.

Growth of the prostatic hypertrophy in the face of greatly reduced androgen is well explained by the endocrinologic doctrine of threshold. The prostate has a lower threshold to androgen than the seminal vesicle. Working with crude extracts Moore and Gallagher[28] found that about 3 times as much androgen was required to show effects in the seminal vesicle as in the prostate. This has been confirmed with pure androgens.[29, 30] There is a differential threshold in the prostatic lobes in the

rat to androgen. On the tenth day after castration involutionary changes were first detected cytologically in the anterior lobe (coagulating gland) although they had been noticed on the fifth day in the other prostatic lobes.[30] The evidence that there is a low threshold to androgen in human prostatic hypertrophy is based on the slowness of development of post-castrational atrophy and the resistance to estrogen in comparison to the laboratory animals.

Conclusion

The epithelium of the cortical prostate differs from that of the benign prostatic hypertrophy in its response to estrogen; this observation indicates that the prostate gland of man is composed of two different functional areas.

Benign prostatic hypertrophy in man consists of multiple spheroidal neoplastic nodules arising in the medullary portion of the prostate because of a testicular stimulus presumably androgen acting over a long period of years on a tissue which at that time has a low threshold to androgens.

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DIAGNOSIS OF THE TETRALOGY OF FALLOT AND MEDICAL ASPECTS OF THE SURGICAL TREATMENT*

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THE tetralogy of Fallot, as described by Fallot,[1] consists of pulmonary stenosis or atresia combined with dextroposition of the aorta, an interventricular septal defect, and right ventricular hypertrophy. It is worthy of note that although Fallot emphasized that such cases constituted a pathological entity, the first case was described more than 100 years earlier by Sandifort.[2]

The pulmonary stenosis usually involves the musculature of the right ventricle below the pulmonary valve. Sometimes the stenosis extends up to the valve itself as in Figure 1. It is, however, common to find the maximum stenosis occurs in the infundibulum of the right ventricle as shown in Figure 2. Although the pulmonary artery is usually smaller than the aorta, the pulmonary artery beyond the pulmonary valve is normally formed. Dextroposition of the aorta means that the aorta, although it arises from the left ventricle, over-rides the top of the ventricular septum and receives some blood directly from the right ventricle. The over-riding of the aorta renders inevitable a high ventricular septal defect. Such is the nature of the "interventricular" septal defect in the tetralogy of Fallot. The pulmonary stenosis and the dextroposition of the aorta both increase the work of the right ventricle. Consequently there is right ventricular hypertrophy.

Clinically a patient with this malformation shows cyanosis and clubbing and a heart of normal size. A systolic thrill and a harsh systolic murmur along the left sternal border are of common occurrence, but neither the murmer nor the thrill are essential for the diagnosis. Indeed if the pulmonary stenosis is extreme too little blood may pass through the pulmonary orifice to produce a murmur. The over-riding of the

* From the Department of Pediatrics of the Johns Hopkins Medical School and the Harriet Lane Home of the Johns Hopkins Hospital, June 1947.

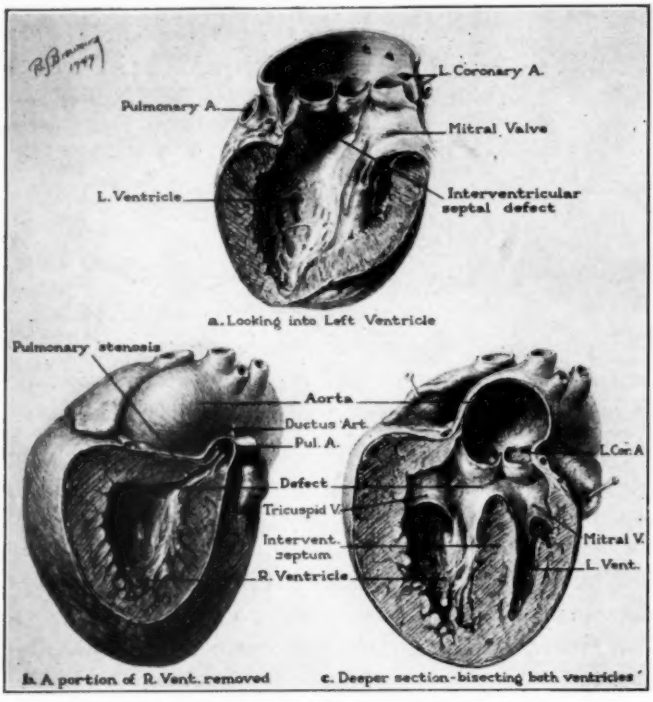

Figure 1: Tetralogy of Fallot.

aorta in a tetralogy of Fallot does not in itself cause a murmur.* The intensity of the second sound varies with the size and position of the aorta. It may be louder to the left than to the right of the sternum. Nevertheless, inasmuch as there is pulmonary stenosis, the second sound at the base is never reduplicated. Indeed the only significant auscultatory finding is the purity of the second sound at the base of the heart.

The blood pressure is narrow and often difficult to obtain.

The electrocardiogram shows a right axis deviation. Almost always the P waves in Lead II are abnormally high; frequently they are 5 mm. in height and occasionally 10 mm.

The diagnosis is established by fluoroscopy. Although in some instances the heart is slightly enlarged, it is usually within normal

* This statement is based upon clinical findings which have been repeatedly checked at autopsy.

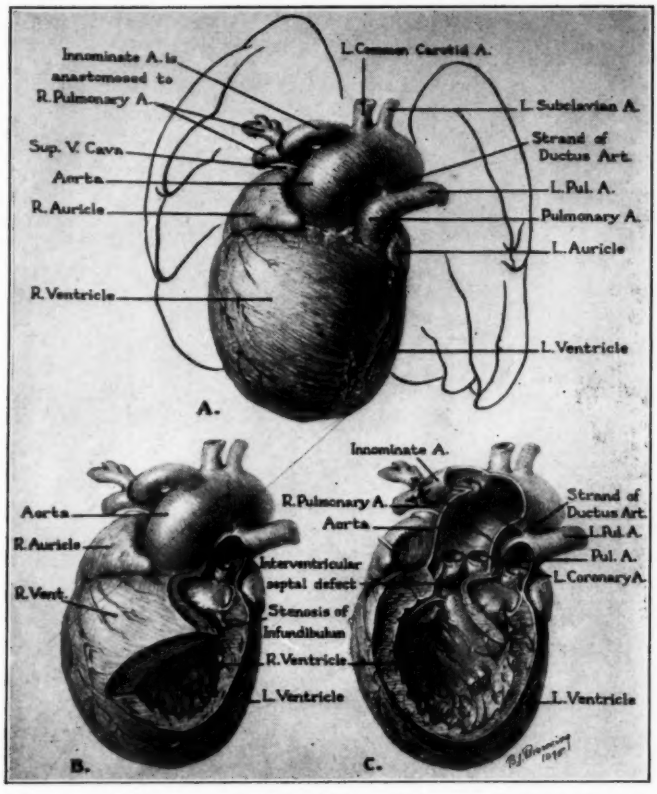

Figure 2: Tetralogy of Fallot, showing Infundibulum Stenosis and Anastomosis of Innominate Artery to Right Pulmonary Artery.

limits. The contour of the heart is characteristic. There is no fullness in the region of the pulmonary conus; consequently the shadow at the base of the heart to the left of the sternum has a concave margin (see Figure 3). Examination in the oblique views is of diagnostic help. In the left anterior oblique position, the heart is but slightly enlarged and the pulmonary window (i. e., the area below the aortic window which is usually occupied by the pulmonary artery) is abnormally clear. In the right anterior oblique position, the upper margin of the cardiac silhouette shows a concavity at the junction of the aorta with the right ventricle.

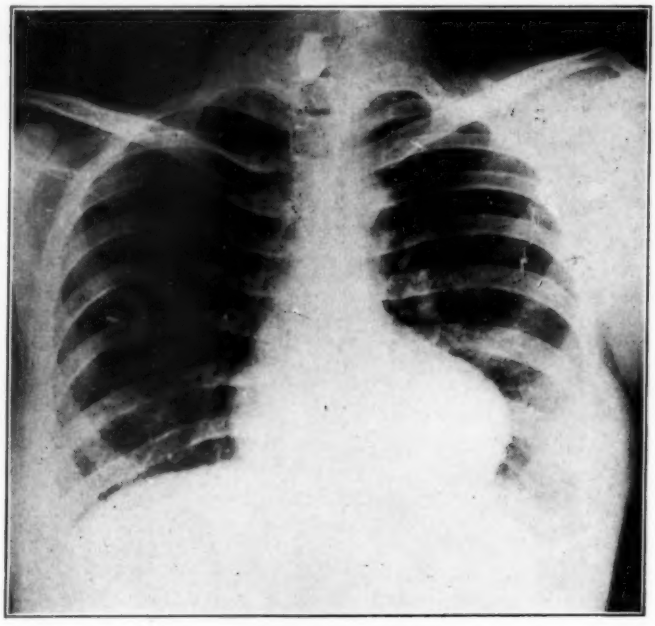

Figure 3: Tetralogy of Fallot with Left Aortic Arch.

The hilar shadows are of prime importance. Owing to the diminished pulmonary blood flow, the hilar shadows are usually minimal. Occasionally, if the principle pathway of the collateral circulation is by way of the posterior mediastinal arteries these shadows become dense.

The contour of the heart characteristic of a tetralogy of Fallot is easily differentiated from that in which there is fullness of the pulmonary conus (see Figure 4). Such a contour is indicative of a large normally placed pulmonary artery and usually connotes excessive circulation to the lungs. Not infrequently upon fluoroscopy a hilar dance is visible. Dancing hilar shadows are caused by pulsations in the pulmonary vessels and are indicative of excessive pulmonary blood flow to the lungs. Hence such shadows are a contraindication for operation.

The x-ray contour shown in Figure 5 is less readily differentiated from that of a tetralogy of Fallot. However, upon fluoroscopy after the observer's eyes were fully accommodated, there were expansile

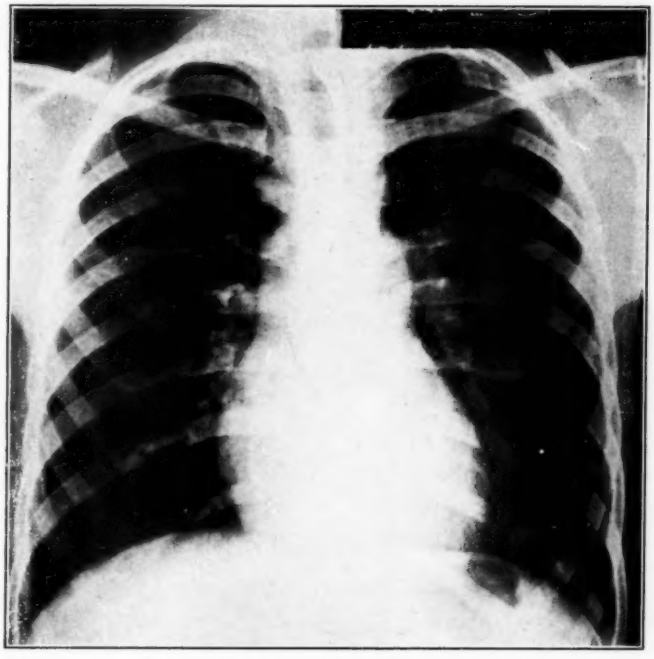

Figure 4: Eisenmenger Complex.

pulsations in both hilar regions. In such cases, even though the patient is cyanotic, operation is contraindicated.

Although not essential for the diagnosis of a tetralogy of Fallot, prior to operation it is important to ascertain the direction of the aortic arch. A right aortic arch occurs in 20 to 25 per cent of all cases of a tetralogy of Fallot. Under such circumstances, the innominate artery lies to the left of the sternum. Furthermore, the subclavian artery is given off the innominate artery at a better angle for anastomosis than it is from the arch of the aorta. Therefore the operation is best performed on the opposite side to that upon which the aorta arches.

The position of the aortic arch is determined by x-ray and fluoroscopy.[3] With a normal left aortic arch, the aortic knob is usually visible upon the left. Upon the delineation of the esophagus with a barium

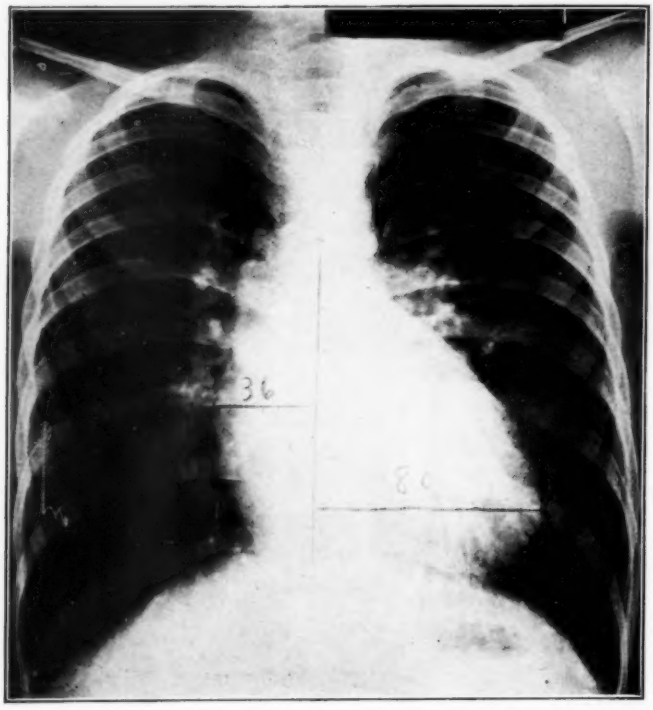

Figure 5: Heart with a Contour similar to Tetralogy of Fallot, but with Pulsations in the Hilar Regions.

opaque mixture, the esophagus descends in the mid-line and is indented by the aorta on its left margin to the right. Examination in the oblique positions aids in determining the course of the aorta. In the right anterior oblique position, the esophagus huugs the cardiac shadow and is slightly displaced posteriorly by the arch of the aorta; in the left anterior oblique position, the esophagus descends independently from the aorta. When the aorta arches to the right and descends upon the right, the aortic knob lies within the shadow cast by the superior vena cava; consequently in the A-P position the aortic knob is seldom visible. The esophagus is deviated to the left. It usually lies at the extreme left margin of the great vessels and its right border is indented to the left by the aorta (see Figure 6). If the esophagus is displaced backward by

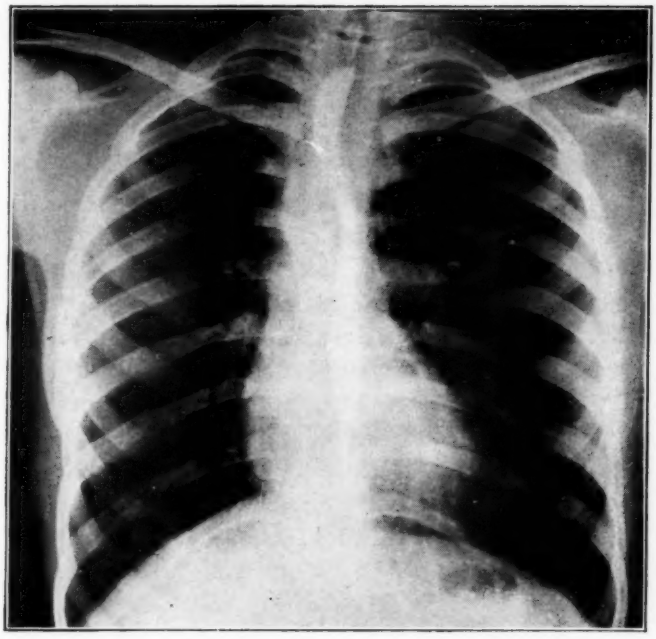

Figure 6: Tetralogy of Fallot with a Right Aortic Arch (A.P. View).

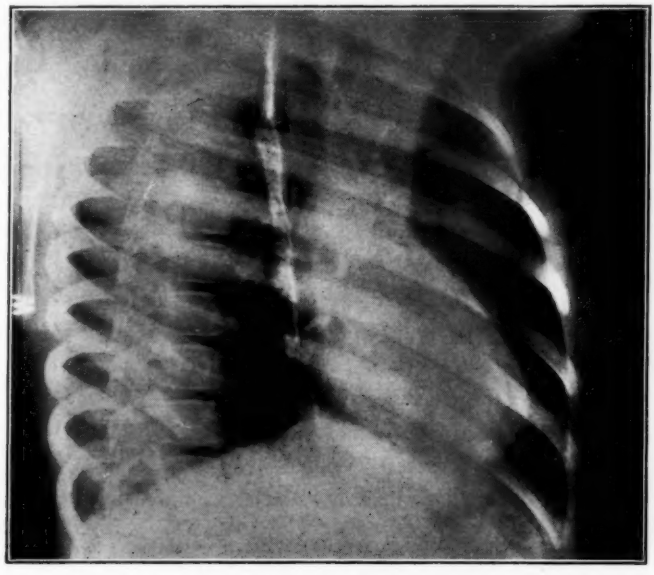

Figure 7: Tetralogy of Fallot with Right Aortic Arch (Right-Anterior Oblique View).

the aorta the displacement is visible in the left anterior oblique position. Even if this does not occur, the esophagus in the right anterior oblique position descends independently from the heart and the aorta (see Figure 7).

The operation is designed to increase the circulation to the lungs by the creation of an artificial ductus arteriosus.[4,5] This is accomplished by the anastomosis of the proximal end of either the subclavian artery, the innominate artery, or the common carotid artery to the side of the right or left main pulmonary artery. Such an operation is described as an end-to-side anastomosis. Collateral circulation is relied upon to carry the blood to the part which has been deprived of its normal circulation. In our experience the collateral circulation to the arm is always adequate: no difficulty has resulted from the sacrifice of the subclavian artery.* When the innominate or the common carotid artery is used there is danger of cerebral thrombosis. Usually, however, this can be overcome. Whenever possible it is preferable to use the subclavian artery. Occasionally the right pulmonary artery is abnormally short and consequently it is necessary to sever the pulmonary artery and to anastomose the proximal end of the systemic artery to the distal end of the right pulmonary artery. Such an operation is spoken of as an end-to-end anastomosis.

Although an end-to-end anastomosis is technically easier than is an end-to-side anastomosis, wherever possible an end-to-side anastomosis is preferable. An end-to-side anastomosis permits the flow of blood to both lungs whereas an end-to-end anastomosis places the entire load upon one lung. Furthermore, with an end-to-side technique the two vessels used for the anastomosis do not need to be of the same size. If the end of a large vessel is anastomosed to the end of a small vessel, thrombosis is liable to occur at the site of the anastomosis. The end-to-side anastomosis has the additional advantage that if the vessel is not sufficiently large or does not increase in size with the growth of the child, it should be possible, at a future date, to perform a similar operation on the opposite side. Finally, if thrombosis occurs following an end-to-side anastomosis, the resulting condition is the same as it was prior to operation whereas in case of thrombosis of an end-to-end

* The author has heard of one case in which the arm was injured by the sacrifice of the subclavian. In that case the child had a hemiatrophy and the radial pulse was not palpable before operation. At operation the subclavian artery was of good size. Evidently if a good-sized subclavian artery does not give a pulse at the wrist, collateral circulation is not sufficient to compensate for the sacrifice of this vessel.

anastomosis, the circulation to the entire lung is cut off; this is almost inevitably fatal.

The indications for operation vary with the age of the patient and depend upon the severity of the pulmonary stenosis and upon the height of the compensatory polycythemia. Children are a better operative risk than are infants or adults. Therefore, whenever possible it is advisable to postpone operation until the patient is over two years of age and to perform it before he is fifteen years of age.

Early operation is indicated if an infant suffers from repeated attacks of paroxysmal dyspnea or the anoxemia is of such severity as to cause loss of consciousness. If, however, the general condition of the infant is good and the attacks are not severe, it is wiser to postpone operation until the child is older. Delay in sitting, crawling, or walking is not sufficient indication for operation under two years of age.

In children and young adults the indications for operation depend mainly upon the degree of incapacity of the individual and the height of the red blood cell count and the hematocrit reading. A person with an extreme degree of polycythemia, as for example, a red blood cell count of 8.5 million or above, or a hematocrit reading of over 80, is in danger of cerebral thrombosis. Successful operation causes the red blood cell count, the level of the hemoglobin, and the hematocrit reading to return to normal and thus eliminates this danger. Children who are markedly incapacitated, even though they do not have a polycythemia, can be greatly benefited by operation. Such children have a very low oxygen saturation of the arterial blood or the oxygen saturation of the arterial blood drops markedly with exercise. A child with an arterial oxygen saturation of 30 per cent usually can walk only a few feet. If the oxygen saturation of the arterial blood drops markedly with exercise it is a definite indication for operation. In one instance, that of a four year old boy, the oxygen saturation of the arterial blood dropped from 41.2 to 15.2 per cent upon climbing two steps, three times. Indeed if the oxygen saturation drops from 80 to 50 per cent on exertion, that, too, is an indication for operation.

If there is evidence that, in the future, operation will be necessary, it is advisable, whenever possible, to operate before 12 or 14 years of age. The tissues of an adult are less resilient than those of a child and the lungs do not adjust as readily to the increased circulation.

The choice of the vessel to be used at operation depends upon the

size of the vessels and the severity of the reduction of the pulmonary blood flow. In infants the subclavian artery is a tiny vessel; therefore the use of the innominate artery is almost invariably indicated. On the other hand, in patients over fourteen years of age the use of the innominate artery is almost always contraindicted; it places too great a strain upon the lungs. Therefore it is only in children that the selection of the vessel is of concern. Whenever possible the use of the subclavian artery is preferable to the innominate artery because as previously mentioned, the former entails less danger of cerebral thrombosis. Recent experience has shown that in children over two years of age, the subclavian artery is usually sufficiently large to raise the oxygen saturation of the arterial blood to 70 or 80 per cent. If the child is of frail build the subclavian may be a small vessel. It is advisable under such circumstances to postpone the operation, if possible, until the child is six or seven years of age in order that the subclavian artery will be sufficiently large to give the desired increase in the pulmonary circulation.

The benefit derived from increasing the circulation to the lungs is immediately apparent. When the patient is first anesthetized and given a high concentration of oxygen, his color improves greatly. After the opening of the chest and the collapse of one lung, he becomes cyanotic. When the circulation to that lung is cut off, the child usually becomes deeply cyanotic. This is of no great concern provided the heart action remains strong. After the completion of the anastomosis, just as soon as the clamps are removed and blood flows to the lungs, one can watch the patient's color improve. As the lungs are re-expanded the color continues to improve. By the time the chest is closed and the drapes are removed and oxygen has been discontinued, the patient's lips are usually of normal color. Indeed, the color of the patient's lips and cheeks at this time generally gives an indication of the amount of benefit derived from the operation. Although the maximum arterial oxygen saturation is not immediately obtained there is an abrupt increase in the oxygen saturation of the arterial blood at the end of operation. In one case it rose from 30 to 69 per cent; in another from 24 to 63 per cent.

If the polycythemia is marked or if the cerebral circulation has been disturbed, venisection at the end of operation is a sound physiological procedure. Just as soon as the circulation to the lungs is increased, the need for the polycythemia has been removed. Venisection at this time lessens the load upon the lungs and lessens the danger of cerebral throm-

bosis. A normal adult can give 500 cc. of blood without difficulty. A child with a marked polycythemia is greatly benefited by the withdrawal of 100 to 250 cc. of blood depending upon the size of the child and the degree of the polycythemia.

The routine postoperative care includes the use of oxygen, penicillin, sedation and the careful regulation of the fluid intake. The last mentioned is the only one of these procedures which requires special consideration. The maintenance of correct fluid intake before, during and after operation is of great importance.

Inasmuch as patients with polycythemia are liable to develop cerebral thrombosis it is always important to prevent dehydration. Prior to operation these children should always receive 1500 cc of fluid per day and young adults over 2000 cc. Care should be taken not to dehydrate the patient the night before operation. Twelve hours without fluid is liable to cause cerebral thrombosis even though the circulation to the brain is not disturbed. If the innominate artery or carotid artery is used at operation, the danger of cerebral thrombosis is increased.

There is, however, less danger of postoperative pulmonary edema and pulmonary effusion if a low fluid intake is maintained during and immediately after operation. During the operation the patient is given slow continuous intravenous fluid so that in case of hemorrhage the blood loss can be promptly replaced by plasma. Except in cases of hemorrhage, the infusion of plasma should be small in order to lessen the danger of pulmonary edema upon the release of the clamps after the completion of the anastomosis. During the first twenty-four hours (midnight to midnight) of the day of operation, most infants require 750 to 900 cc. of fluid; children two to ten years of age require approximately 1000 cc. of fluid and adults should not receive over 1800 to 2000 cc. of fluid. This total fluid intake includes the fluids given during the operation (except that which is required to replace blood loss from severe hemorrhage): the fluids given intravenously, and that which is taken by mouth. Therefore, if shortly after operation fluids by mouth are well tolerated, the intravenous fluid should be decreased or discontinued.

The most serious postoperative complications are cerebral thrombosis, pleural effusion, pneumothorax, cardiac failure and suppression of renal function and thrombosis at the site of the anastomosis. The last mentioned nullifies the benefit to be derived from operation.

Cerebral thrombosis and *hemiplegia* are especially likely to occur when the circulation to the brain has been disturbed by the use of the innominate or the common carotid artery. The danger is increased by the marked polycythemia and by dehydration. The period of greatest danger is four to twenty hours after operation. The development of a hemiplegia or of paresis of any of the extremities calls for prompt treatment. Heparin causes an immediate prolongation of the clotting time and therefore is of far greater benefit than is dicoumarol. The initial dose of heparin (0.5 mgm. per kilogram of body weight) is given intravenously; this is followed by the slow continuous administration of heparin. This is best accomplished by the addition of heparin to the plasma, glucose, or saline, which is given by continuous intravenous drip. The objective is to prolong the clotting time of the blood to twenty minutes. Approximately the same amount of heparin per hour is required to maintain the increased clotting time as is initially required to raise it to a given level. The estimated amount of heparin should be combined with the amount of fluid required per hour. For example, if the patient weighs 20 kilograms and is to receive 100 cc. of fluid per hour for the next few hours, 10 mgm. of heparin is added to 100 cc. of the fluid and the clotting time is checked at the end of one half hour. Then if the fluid is to be reduced to 75 cc. of fluid the next hour, 10 mgm. of heparin should be added with the next 75 cc. of fluid provided the desired clotting time is obtained. If the clotting time is not sufficiently prolonged, more heparin is added to the solution; if it is excessively high, more fluid is added and the concentration of the heparin is thereby reduced. It is advisable to continue to use heparin for 12 to 48 hours depending upon the condition of the patient. If treatment is promptly instituted it is often possible to overcome the paralysis and prevent the development of any residual hemiplegia.

Pnemothorax may result from injury to the lung at the time of operation or from the use of too great positive pressure at the time of the re-expansion of the lung. The latter may occur on the side opposite to that of operation. Unless there is a tension pneumothorax, simple aspiration usually suffices. A tension pneumothorax may require continuous suction.

Pleural effusion is a common complication. The fluid is usually hemorrhagic. Pleural effusion occurs so frequently that a portable x-ray plate the evening after operation is a wise precaution. If there is no

demonstrable fluid eight to ten hours after operation, it is reasonably certain that there will be no serious embarrassment from a pleural effusion before morning; it does not however mean that no fluid will accumulate. Indeed, aspiration of a pleural effusion is often necessary one to two days after operation. Not infrequently repeated aspirations are needed. While there is any tendency for fluids to accumulate in the chest, care should be taken that the patient does not receive an excessive amount of fluid by mouth.

Slight increase in the size of the heart after operation is relatively common. Usually, however, once the heart has adjusted to the load placed on it by the altered circulation, there is no further cardiac enlargement. Slight engorgement of the liver frequently occurs during the first week after operation. Digitalis is helpful at this stage, but if the child responds promptly, it is seldom necessary to continue it over a period of weeks. Diuretics, especially theocalcin, are of value in cases of engorgement of the liver and are strongly indicated if the urinary output is low.

Suppression of kidney function is a common complication. The cause is not clear. Diuretic and digitalis are both helpful.

Hypertension in the early postoperative period is of frequent occurrence. It usually causes no concern; on the contrary, it improves the circulation to the brain and lessens the danger of cerebral thrombosis. It is important to remember that even though the blood pressure may be difficult to obtain before operation, it should be readily obtainable within two to three hours after operation. If the blood pressure does not rise promptly, plasma should be given or the rate of the flow of plasma should be increased.

Although there are many possible serious complications, it is remarkable how smooth the postoperative course usually is and how rapid and how great is the improvement. A liquid diet may be allowed on the day of operation and the following day a soft diet is often desired. The child is usually free of pain and comfortable without oxygen in four days time and ready for discharge in two to three weeks.

The results of the first three hundred operations are briefly summarized as follows: 54 (18 per cent) have died at, or shortly after, operation; 9 cases (3 per cent) were found to be inoperable but survived an exploratory thoractomy. Ten children (3.5 per cent) were unimproved by operation; in most of these cases thrombosis occurred

at the site of the anastomosis. Three of the patients who were unimproved, died within six months of operation. Eleven or 4.5 per cent were helped but not brilliantly improved. Two hundred and fifteen patients (71 per cent) were greatly benefited by operation. An excellent result means that the cyanosis virtually disappears; that the lips are of normal color, there may be slight cyanosis of finger tips but clubbing recedes. The oxygen saturation of the arterial blood rises to 80 per cent or above and the red blood cell count, the hemoglobin level, and hematocrit reading return to normal values. The heart, is, of course, not normal. On the contrary, murmurs are louder than before operation; and in addition to the systolic murmur, there is a loud continuous murmur heard throughout the chest, front and back. The amount of increase in the heart size has varied considerably but after the initial increase, in only one instance during the first postoperative year, has there been evidence of progressive cardiac enlargement.

Although the heart is not normal and the danger of subacute bacterial endocarditis is not eliminated, both the danger of dying from anoxemia and the danger of cerebral thrombosis have been overcome. The child is able to measure his exercise tolerance not in terms of feet but in terms of miles. Although it is too early to determine whether the child's life may or may not be prolonged by operation, it is certainly happier.

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